



The role of transport processes on dielectric elastomer performance

Madsen, Line Riis; Hassager, Ole; Skov, Anne Ladegaard

Publication date:
2016

Document Version
Peer reviewed version

[Link back to DTU Orbit](#)

Citation (APA):
Madsen, L. R., Hassager, O., & Skov, A. L. (2016). *The role of transport processes on dielectric elastomer performance*. Abstract from 12th Annual Polymer Day 2016, Kgs. Lyngby, Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

The role of transport processes on dielectric elastomer performance

Line Riis Madsen (linmads@kt.dtu.dk), Ole Hassager & Anne Ladegaard Skov

Danish Polymer Center, Department of Chemical and Biochemical Engineering, Technical University of Denmark, Building 227, 2800 Kgs. Lyngby, Denmark



A dielectric elastomer (DE) is a thin elastomer film sandwiched between two compliant electrodes, and upon application of an electrical field the DE increases in area and decreases in width. DEs are soft transducers that can be used as actuators, generators and sensors. They are sought optimized by various means, but most of them include introducing high-permittivity particles into the elastomer film. These particles should theoretically increase the actuation performance, but unfortunately they also causes premature electrical breakdown to occur.

The scope of this project is to understand the parameters that lead to breakdown by modelling the performance of DEs during operation. A breakdown may arise from the effect of several different electrical aging mechanisms, which can be categorized as either degradation or intrinsic breakdown mechanisms based on the required time to cause a breakdown of the materials, illustrated in Figure 1. The mechanisms of most importance are electrical and thermal breakdown, which are also the ones of most interest in this project. A preliminary model of thermal breakdown will be used as one of the starting points for further modelling of breakdown of DEs during operation.

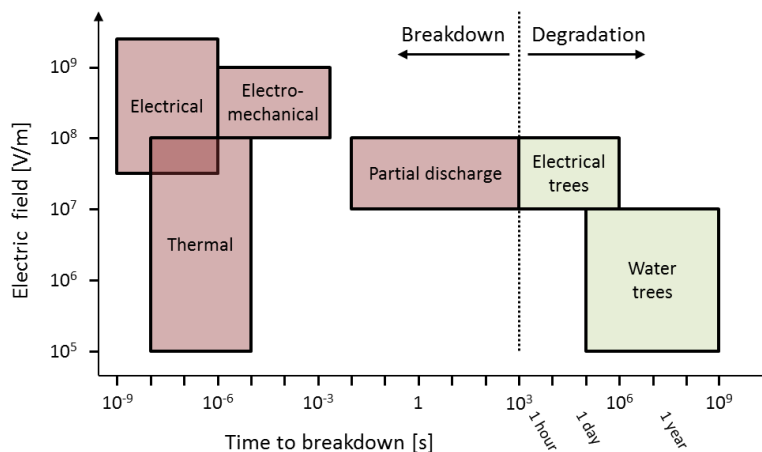


Figure 1: Schematic overview of different types of electrical aging mechanisms that a dielectric elastomer can be subjected to.